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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/725,397

12/03/2003

Masao Kato

03500.017754.

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7590

04/07/2010

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EXAMINER

KAU, STEVEN Y

ART UNIT

PAPER NUMBER

2625

MAIL DATE

DELIVERY MODE

04/07/2010

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/725,397	Applicant(s) KATO ET AL.	
	Examiner STEVEN KAU	Art Unit 2625	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 February 2010.
- 2a) ☐ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,7,13 and 25-29 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,7,13 and 25-29 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Remarks

1. Note to the applicant. This is a Final Action to supersede the Non-Final Action which was sent on March 23, 2010.

Response to Amendment

2. This is in response to Applicant(s) arguments filed on 01/21/2010 and supplemental amendment on 02/16/2010.

- The following is the current status of claims:

Claims 2 to 6, 8 to 12, 14 to 24 and 30 have been canceled. Claims 1, 7, 13, and 25 to 29 remain pending for examination, with claims 1, 7, 13, 25, 26 and 27 being independent. Claims 1, 7, 13, 25 to 27 and 29 have been amended.

- Response to Remarks/Arguments:

(1) Applicant's arguments with respect to the rejection of claims 1, 7, 13, and 25 to 29 under 35 U.S.C. 103(a) have been fully considered but are moot in view of the new ground(s) of rejection due to the amendments.

Duplicate Claims

3. Claims 25, 26, and 27 are objected to under 37 CFR 1.75 as being a substantial duplicate of claims 1, 7, and 13, respectively. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it

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is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

With respect to claims 1 and 25, are directed to an image processing apparatus. The comparisons of these two claims are summarized below:

#	Claim 1	#	Claim 25
Pream	An image processing apparatus for executing an error diffusion process to color data having a plurality of density components including at least first and second density components, comprising:	Pream	An image processing apparatus for executing an error diffusion process to color data having a plurality of density components including at least first and second density components, comprising:
A	a processor and a memory;	A	a processor and a memory;
<i>B</i>	a first processing unit that modulates at least one of a quantization threshold value and a quantization diffusion coefficient on the basis of the first density component, and executes the error diffusion process to the first density component by using at least one of the modulated quantization threshold value and the modulated quantization diffusion coefficient;	B	a first processing unit that modulates at least one of a quantization threshold value and a quantization diffusion coefficient on the basis of the first density component, and executes the error diffusion process to the first density component by using at least one of the modulated quantization threshold value and the modulated quantization diffusion coefficient;
C	a second processing unit that executes the error diffusion process to the second density component by using a fixed modulated quantization threshold value and a fixed quantization diffusion coefficient, wherein the error	C	a second processing unit that executes the error diffusion process to the second density component by using a fixed modulated quantization threshold value and a fixed modulated quantization diffusion coefficient, wherein the error

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	diffusion process executed by the second processing unit requires a lighter processing load than the error diffusion process executed by the first processing unit; and		diffusion process executed by the second processing unit requires a lighter processing load than the error diffusion process executed by the first processing unit; and
D	an error diffusion processing control unit that controls to execute, by the first processing unit, the error diffusion process to the first density component, and controls to execute, by the second processing unit, the error diffusion process to the second density component, wherein the first and second density components have respective different component types and wherein one dot output based on the first density component has a lower density than one dot output based on the second density component, wherein the modulated quantization diffusion coefficient is used to diffuse an error caused by a quantization process which is performed using the modulated quantization threshold value to neighboring pixels, and wherein the fixed quantization diffusion coefficient is used to diffuse an error caused by a quantization process which is performed using the fixed quantization threshold value to neighboring pixels.	D	an error diffusion processing control unit that controls to execute, by the first processing unit, the error diffusion process to the first density component, and controls to execute, by the second processing unit, the error diffusion process to the second density component, wherein the first and second density components have respective different component types and wherein one droplet output based on the first density component has a smaller size than one droplet output based on the second density component, wherein the modulated quantization diffusion coefficient is used to diffuse an error caused by a quantization process which is performed using the modulated quantization threshold value to neighboring pixels, and wherein the fixed modulated quantization diffusion coefficient is used to diffuse an error caused by a quantization process which is performed using the fixed quantization threshold value to neighboring pixels.

With respect to claim 7 and 26, are directed to a method for image processing, and both claims cite identical method steps. Claims 13 and 27 are directed a computer-readable storage medium, and both claims cite identical processing steps.

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Thus, claims 25, 26 and 27 are objected to under 37 CFR 1.75 as being a substantial duplicate of claims 1, 7, and 13, respectively.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 1, 7, 13, and 25 to 29 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. With respect to claim 1, limitation recites, "a second processing unit that executes the error diffusion process to the second density component by using a fixed modulated quantization threshold value and a fixed quantization diffusion coefficient", (emphasis added by the examiner). The underlined phrase is a new matter introduced into the claim. The original specification, i.e. the embodiment of Figure 5, Step S5006, does not disclose such feature of "using a fixed modulated quantization threshold value and a fixed quantization diffusion coefficient". Independent claims 7, 13, 25, 26 and 27 recite the identical claim element, thus, these claims are rejected under 35 U.S.C. 112, first paragraph for the same reason discussed above. Claims 28 and 29 are rejected under 35 U.S.C. 112, first paragraph because of their dependency to claim 1.

Claim Rejections - 35 USC § 101

6. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

7. Claims 13 and 27 are rejected under 35 U.S.C. §101 because the claimed inventions are directed to non-statutory subject matter. Claims 13 and 27 are directed to “a computer-readable storage medium”. The recent Office Gazette Notice (Volume 1351, February 23, 2010) regarding “computer-readable storage medium” claims makes clear that the terms "computer-readable storage medium" and "machine-readable storage medium" are presumed to include ineligible transitory signals.

The sections of the Office Notice, recites:

“The United States Patent and Trademark Office (USPTO) is obliged to give claims their broadest reasonable interpretation consistent with the specification during proceedings before the USPTO. See *In re Zletz*, 893 F.2d 319 (Fed. Cir. 1989) (during patent examination the pending claims must be interpreted as broadly as their terms reasonably allow). The broadest reasonable interpretation of a claim drawn to a computer readable medium (also called machine readable medium and other such variations) typically covers forms of non-transitory tangible media and transitory propagating signals per se in view of the ordinary and customary meaning of computer readable media, particularly when the specification is silent. See MPEP 2111.01.”

“When the broadest reasonable interpretation of a claim covers a signal per se, the claim must be rejected under 35 U.S.C. § 101 as covering non-statutory subject matter. See *In re*

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Nuijten, 500 F.3d 1346, 1356-57 (Fed. Cir. 2007) (transitory embodiments are not directed to statutory subject matter) and Interim Examination Instructions for Evaluating Subject Matter Eligibility Under 35 U.S.C. § 101, Aug. 24, 2009; p. 2.”

“..... A claim drawn to such a computer readable medium that covers both transitory and non-transitory embodiments may be amended to narrow the claim to cover only statutory embodiments to avoid a rejection under 35 U.S.C. § 101 by adding the limitation "non-transitory" to the claim. Cf. Animals - Patentability, 1077 Off. Gaz. Pat. Office 24 (April 21, 1987) (suggesting that applicants add the limitation "non-human" to a claim covering a multi-cellular organism to avoid a rejection under 35 U.S.C. § 101). ...”

A signal is a form of energy. Thus, a signal is not a machine, not a process, not a manufacturing and composition of matter. Therefore, the claimed subject matter, i.e. a “computer-readable storage medium” in claims 13 and 27 is directed to a non-statutory subject matter. Thus, claims 13 and 27 are rejection under 35 U.S.C. §101. As indicated in the Office Gazette notice, the term "non-transitory" can be used in the claim to exclude ineligible signal embodiments and make the claim eligible under 101.

The Office Gazette notice can be found at

<http://www.uspto.gov/web/offices/com/sol/og/2010/week08/TOC.htm#ref20>.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

9. Claims 1, 7, 13, 25-27, and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tajika et al (US 5,142,374) in view of Hong et al (US 6,614,556) and Shibaki et al (US 2001/0019632).

Regarding to claim 1.

Tajika discloses an image processing apparatus for executing an error diffusion process to color data having a plurality of density components including at least first and second density components (**i.e. referring to Fig. 1, an image process system performs error diffusion process to color components, i.e. cyan, magenta, yellow and black, col 4, lines 31-59**), comprising: a processor and a memory (**i.e. referring to Fig. 9, an image processing system includes a CPU, or a microprocessor and memory, col 8, lines 18-38**); a first processing unit (**i.e. referring to Fig. 1, a binary circuit 25**) that executes the error diffusion process (**i.e. a dither process for dark ink**) to the first density component (**i.e. error diffusion process is**

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performed for multi-drop pixels with a plurality of threshold levels corresponding to different gray values, or density values, col 6, lines 18-36);

a second processing unit (**i.e. referring to Fig. 1, a binary circuit 26**) that executes the error diffusion process (**i.e. a dither processing for light ink**) to the second density component by, wherein the error diffusion process executed by the second processing unit requires a lighter processing load than the error diffusion process executed by the first processing unit (**i.e. Tajika discloses two different dithering processes, one for dark density ink and the other for light density ink; for dark density ink, error diffusion process is performed with a plurality of threshold values and thus it requires longer time to complete the process, col 6, lines 18-36);** and

an error diffusion processing control unit (**Masking/UCR Processing 23 of Fig. 1, Image Processing Circuit 41 of Fig. 4, & Image Processing Circuit 71 of Fig. 7**) that controls to execute, by the first processing unit, the error diffusion process to the first density component (**i.e. a dither, or error diffusion process is performed for color pixels with a plurality of threshold levels corresponding to different density values, col 6, lines 18-36**), and controls to execute, by the second processing unit (**i.e. referring to Fig. 1, a binary circuit 26**), the error diffusion process to the second density component, wherein the first and second density components have respective different component types and wherein one dot output based on the first density component has a lower density than one dot output based on the second density component (**i.e. Tajika discloses a color density discrimination table separating light and dark inks based on ink density, and different dither processes are performed to light/dark ink in accordingly; thus, one dot of output based on the second process of Tajika has lower**

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density of the dot processed in the second Tajika's dither process, Figs. 1-3, col 4, lines 30-59).

Tajika does not disclose modulating and using at least one of a quantization threshold value and a quantization diffusion coefficient on the basis of the first density component; using a fixed modulated quantization threshold value and a fixed quantization diffusion coefficient; and wherein the modulated quantization diffusion coefficient is used to diffuse an error caused by a quantization process which is performed using the modulated quantization threshold value to neighboring pixels, and wherein the fixed quantization diffusion coefficient is used to diffuse an error caused by a quantization process which is performed using the fixed quantization threshold value to neighboring pixels.

In the same field of endeavor, Hong teaches modulating at least one of a quantization threshold value and a quantization diffusion coefficient on the basis of the first density component (**referring to Fig. 1, Threshold Modulator 140 modulates threshold value depending on the amount of gray scale value of the pixel or dots in the block, i.e. in a bright region, or in a low density region, if the current pixel is determined as a black pixel and by modulate the threshold value, the adjacent pixels or dots of the block pixel or dot can be avoid being determined as black pixel or dot, col 5, line 43 to col 6, line 54**), and using at least one of a quantization threshold value and a quantization diffusion coefficient on the basis of the first density component (**referring to Fig. 6c, an example of using quantization threshold value and quantization diffusion coefficient on the basis of the first density component set forth above, i.e. white region, or low density region, col 5, line 43 to col 6, line 54 and col 8, lines 1-6**); and wherein the modulated quantization diffusion coefficient is used to diffuse an

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error caused by a quantization process which is performed using the modulated quantization threshold value to neighboring pixels (**referring to Fig. 1, Quantization Unit 120 quantizes the input pixel, and Threshold Modulator 140 modulates the threshold value to distribute error caused by the quantization process as set forth above, col 5, line 18 to col 6, line 3);** and

In the same field of endeavor, Shibaki teaches using a fixed modulated quantization threshold value and a fixed quantization diffusion coefficient (**referring to Fig. 1, a fixed threshold value is read from threshold table and a fixed diffusion coefficient shown in Fig. 2, are used to diffuse error data to the adjacent area, Par. [0044]**), and wherein the quantization diffusion coefficient is used to diffuse an error caused by a quantization process which is performed using the quantization threshold value to neighboring pixels (**referring to Fig 1, a multilevel error diffusion process has a loop in diffusing error data to the adjacent area to improve image reproduction quality, i.e. a fixed threshold value is read in from the threshold table, and the diffusion processing is using three different quantization levels, i.e. 0, 1 and 2 with diffusion coefficient of Fig. 2; this is a repeating process, and therefore, “error arising during the quantization is accumulated in an error buffer 3”, or error caused in the quantization process is also processed in the multilevel error diffusion process, Pars. [0044] to [0046]**).

Having an image processing apparatus of Tajika' 374 reference and then given the well-established teaching of Hong' 556 and Shibaki' 632 reference, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the image processing apparatus of Tajika' 374 reference first to include “modulating and using at least one

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of a quantization threshold value and a quantization diffusion coefficient on the basis of the first density component, and wherein the modulated quantization diffusion coefficient is used to diffuse an error caused by a quantization process which is performed using the modulated quantization threshold value to neighboring pixels” taught by Hong’ 556 reference. The motivation for doing so would have to improve the error diffusion process of Tajika’s image apparatus by effectively eliminating those worm patterns and dots distributed at 45 degrees so that image reproduction quality is greatly improved, and further modulating and using modulated threshold values in the error diffusion process provided could easily be established for one another with predictable results. Then to modify the combination of Tajika and Hong to include “using a fixed modulated quantization threshold value and a fixed quantization diffusion coefficient, and wherein the fixed quantization diffusion coefficient is used to diffuse an error caused by a quantization process which is performed using the fixed quantization threshold value to neighboring pixels” taught by Shibaki. The motivation for doing so would have been to improve image reproduction quality by eliminating band and dropouts as described in Par. [0050], and further, the disclosed technique of using a fixed threshold and diffusion coefficient to distribute error data caused by a quantization process into the neighborhood pixels can be implemented by one another with predictable results.

Regarding to claim 7.

Claim 7 is directed to an image processing method claim which substantially corresponds to operation of the device in claim 1, with method steps directly corresponding to the function of device elements in claim 1. Thus, claim 7 is rejected as set forth above for claim 1.

Regarding to claim 13.

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Claim 13 is directed to a computer-readable storage medium claim which substantially corresponds to operation of process steps in claim 7, with processing steps directly corresponding to the function of method elements in claim 7. Thus, claim 13 is rejected as set forth above for claim 7.

Regarding to claim 25.

Claim 25 is directed to an image processing apparatus claim which substantially corresponds to the operation of the device in claim 1, with identical features corresponding directly to the function of device elements in claim 1. Thus claim 25 is rejected as set forth above for claim 1.

Regarding to claim 26.

Claim 26 is directed to an image processing method claim which substantially corresponds to operation of the device in claim 25, with method steps directly corresponding to the function of device elements in claim 25. Thus, claim 26 is rejected as set forth above for claim 25.

Regarding to claim 27.

Claim 27 is directed to a computer-readable storage medium claim which substantially corresponds to operation of process steps in claim 26, with processing steps directly corresponding to the function of method elements in claim 26. Thus, claim 27 is rejected as set forth above for claim 26.

Regarding claim 28, in accordance with claim 1.

Tajika discloses wherein the plurality of density components correspond to respective different colorants used in image formation (**i.e. density components corresponding to respect**

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colorants, i.e. cyan, and magenta, etc., Fig. 1, col 4, lines 30-59), and wherein a first one of the colorants corresponding to the first density component and a second one of the colorants corresponding to the second density component have similar colors and wherein the first colorant has a lower density than the second colorant (**i.e. light ink component of cyan verse dark ink component of cyan as described in Fig. 3, col 5, lines 12-34**).

10. Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tajika et al (US 5,142,374) in view of Hong et al (US 6,614,556) and Shibaki et al (US 2001/0019632) as applied to claim 1 above, and further in view of Fujimori (US 6,328,404)

Regarding claim 29, in accordance with claim 1.

Tajika does not disclose wherein one dot outputted based on the first density component has a smaller size than one dot based on the second density component.

Fujimori teaches wherein one dot outputted based on the first density component has a smaller size than one dot based on the second density component (**i.e. The maximum density dot represents the dot having a maximum quantity of ink or a maximum area; that is, the dot size of light ink has smaller dot size than dark ink because lighter ink has less ink density than the dark ink, col 19, lines 13-34**).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified Tajika, Hong and Shibaki to include wherein one dot outputted based on the first density component has a smaller size than one dot based on the second density component taught by Fujimori since doing so would have been to enable the apparatus of Tajika to attains high quality printing by expressing densities in a wide range.

Conclusion

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

CONTACT INFORMATION

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Steven Kau whose telephone number is 571-270-1120 and fax number is 571-270-2120. The examiner can normally be reached on Monday to Friday, from 8:30 am -5:30 pm.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Moore can be reached on 571-272-7437. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Steven Kau/
Examiner, Art Unit 2625
March 18, 2010

/King Y. Poon/
Supervisory Patent Examiner, Art Unit
2625

/David K Moore/
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